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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

BUEKER, RICHARD R

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 03/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/720,989

Applicant(s)

HOFFMAN ET AL.

Examiner

Richard Bueker

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

Claims 14-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 14, line 8, the phrase "comprising a plurality of holes therein the lateral surface" is non-idiomatic and unclear. In claim 17, the phrase "the sealing mechanism" lacks antecedent basis and is vague and indefinite.

Claims 1, 4 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Witzman (6,202,591) taken in view of Makino (3,417,733) and Roblin (3,672,327). Witzman's Fig. 14A vapor source (see col. 15, lines 24-38) includes a crucible with a nozzle pipe (chimney) mounted on top of the crucible. The nozzle pipe deflects vapor from the crucible into a horizontal direction and delivers the vapor to a vertically aligned substrate. Regarding the construction of Witzman's vapor source, Witzman teaches (see Figs. 3A, and col. 8, lines 1-35, for example) that a nozzle pipe chimney distributor can successfully be attached to a crucible by placing it from above so that it forms a seal on the top of the crucible. It would have been obvious to one skilled in the art to mount the chimney of Witzman's Fig. 14A in the manner described by Witzman at col. 8, lines 1-35. Regarding claim 9, the screen 474 of Fig. 14A of Witzman includes holes that meet the claim 9 limitation of a nozzle pipe vapor outlet formed by multiple holes positioned one over another.

Witzman does not discuss the use of a filling opening on the upper end of the nozzle pipe as recited in claim 1 as amended. Makino (Figs. 1-3) discloses a vapor source having a nozzle pipe 1, which has nozzle holes on its side to direct vapor laterally onto vertically aligned substrate surfaces to be coated. Makino teaches (col. 3,

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lines 46-75 and col. 4, lines 60-64) that it is desirable to provide a truncated cone shape (see element 2 of Figs. 1-3) having a coaxial filling opening at the top of the nozzle pipe. It would have been obvious to one skilled in the art to provide such a fill opening in the top of Witzman's nozzle pipe in the manner taught by Makino, to provide greater convenience of filling vaporizable material into the vapor source. Regarding the claimed truncated cone shape, Makino teaches that this shape can successfully be used, and it is considered prima facie obvious to use this shape in Witzman's vapor source, at least to the extent presently claimed. Makino intends his filling opening to be closed (col. 4, lines 60-64) by some closure element, but does not discuss what type of closure element he uses to close his inlet hole 2. Roblin (see figs. 3 and 4) also discloses a vaporizer in which a fill plug 50 (see Fig. 4 and col. 5, line 70 to col. 6, line 6) is used to close fill ports. The closure element 50 of Roblin is a "sealing mechanism" as recited in claim 1 as amended. It would have been obvious to provide the fill hole of Makino with a closure plug as taught by Roblin. Regarding claim 4, It is noted that "plunger" is defined as "a person or thing that plunges", while "plunge" is defined as to cast or thrust forcibly or suddenly into something". A fill plug includes a plug portion that thrusts into a fill port by force, and therefore can properly be considered to be a plunger.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Witzman (6,202,591) taken in view of Makino (3,417,733) and Roblin (3,672,327) for the reasons stated in the rejection of claim 1 above, and taken in further view of Nakabayashi (JP 2001 192293). Nakabayashi (see Fig. 8 and page 11, lines 3-20)

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discloses a vapor source having a crucible with a nozzle pipe located thereon. A separate heater is provided for each of the crucible and the nozzle pipe. The heaters are provided for the same purpose as the heaters of Witzman. The crucible heater vaporizes the coating material, and the nozzle pipe heater prevents condensation of the coating vapor with the nozzle pipe. Nakabayashi teaches that it is desirable to provide a first thermocouple to control the crucible heater, and a second thermocouple to control the nozzle pipe heater. It would have been obvious to one skilled in the art to provide the Fig. 14A vapor source of Witzman with separate heaters and separate thermocouples to desirably improve the temperature control of the vapor source.

Claim 3 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Witzman (6,202,591) taken in view of Makino (3,417,733) and Roblin (3,672,327) for the reasons stated in the rejection of claim 1 above, and taken in further view of Goldstein (5,321,260). Goldstein teaches (see the Fig. and col. 4, lines 25-27) the use of a tapered diameter joint to connect a crucible with a nozzle pipe. It would have been obvious to one skilled in the art to use a diameter taper to connect the chimney and crucible of Witzman because Goldstein teaches that a seal of sufficient degree can be successfully formed between a crucible and nozzle pipe using a tapered diameter joint.

Claims 5, 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Witzman (6,202,591) taken in view of Makino (3,417,733) and Roblin (3,672,327) for the reasons stated in the rejection of claim 1 above, and taken in further view of Remondiere (4,880,960), Nakabayashi (JP 2001 192293) and Baxter (5,803,976). Witzman (Figs. 1A and 3A) teaches the step of providing heat reflectors such as

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molybdenum heat shield 86 of Fig. 3A around a vapor source. The heat reflector is enclosed in a water-cooled copper vaporizer housing 90 that is cooled by cooling pipes 92. Fig. 3A of Witzman shows that the reflector and cooled housing are arranged around the heated nozzle pipe chimney 66 to properly maintain the temperature of the heated nozzle pipe. Nakabayashi (Figs. 5 and 8) also teaches the use of a reflector and cooled housing around a nozzle pipe chimney for improved thermal control. The nozzle pipe of Witzman's Fig. 14A is heated to a high temperature in the same manner as the nozzle pipe of Fig. 3A, and it would have been obvious to one skilled in the art to provide it with the same type of thermal shield as in Fig. 3A of Witzman or Nakabayashi. Also, Remondiere (Fig. 1) teaches the use of heat radiation reflectors around a nozzle pipe, and he makes clear that a vapor passage window should be provided in the reflectors at the location of a lateral vapor outlet. It would have been obvious to provide such reflector openings in a reflector around Witzman's Fig. 14A lateral vapor outlet in view of the teachings of Remondiere. Baxter also teaches the use of plural reflectors and a cooled housing (see Figs. 3 and 4). Baxter also teaches the use of a nozzle pipe having horizontally oriented vapor outlet openings (Fig. 5), and one skilled in the art would have recognized that Baxter intended for the embodiment of Fig. 5 to also be provided with reflectors and a cooled housing as in Figs. 3 and 4. From these teachings of Baxter, it also would have been obvious to provide the nozzle pipe of the embodiment of 14A of Witzman with reflectors and a cooled housing.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Witzman (6,202,591) taken in view of Makino (3,417,733) and in view of Roblin (3,672,327), and

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in further view of Remondiere (4,880,960), Nakabayashi (JP 2001 192293) and Baxter (5,803,976) for the reasons stated in the rejection of claims 5, 6 and 8 above, taken in further view of Ingram (5,740,858) (see Fig. 1, for example), who teaches the use of a cooling pipe having a serpentine or meander shape for uniformly cooling a surface.

This is a common and well-known shape for cooling pipes when uniform cooling of an extended area is desired. It would have been prima facie obvious to use this shape on a nozzle pipe housing to uniformly cool the housing. It is noted again that Nakabayashi teaches the desirability of providing a cooled housing around a nozzle pipe.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Witzman (6,202,591) taken in view of Makino (3,417,733) and Roblin (3,672,327) for the reasons stated in the rejection of claim 1 above, and taken in further view of Ney (4,412,508) (abstract) or Mattord (6,011,904) (col. 3, lines 10-17), who teach that graphite can successfully be used as a refractory material of construction for a crucible and nozzle pipe of a vapor source. It would have been obvious to one skilled in the art to utilize graphite as the refractory material of construction of Witzman because the secondary references teach that graphite can successfully be used as a vapor source material of construction.

Claims 14, 15, 19, 20, 22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Witzman (6,202,591) in view of Remondiere (4,880,960), Nakabayashi (JP 2001 192293) and Baxter (5,803,976). Witzman's Fig. 14A vapor source (see col. 15, lines 24-38) includes a crucible with a nozzle pipe (chimney) mounted on top of the crucible. The nozzle pipe deflects vapor from the crucible into a

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horizontal direction and delivers the vapor to a vertically aligned substrate. Regarding the construction of Witzman's vapor source, Witzman teaches (see Figs. 3A, and col. 8, lines 1-35, for example) that a nozzle pipe chimney distributor can successfully be attached to a crucible by placing it from above so that it forms a seal on the top of the crucible. It would have been obvious to one skilled in the art to mount the chimney of Witzman's Fig. 14A in the manner described by Witzman at col. 8, lines 1-35.

Regarding claim 20, the screen 474 of Fig. 14A of Witzman includes holes that meet the claim 20 limitation of a nozzle pipe vapor outlet formed by multiple holes positioned one over another. Witzman (Figs. 1A and 3A) teaches the step of providing heat reflectors such as molybdenum heat shield 86 of Fig. 3A around a vapor source. The heat reflector is enclosed in a water-cooled copper vaporizer housing 90 that is cooled by cooling pipes 92. Fig. 3A of Witzman shows that the reflector and cooled housing are arranged around the heated nozzle pipe chimney 66 to properly maintain the temperature of the heated nozzle pipe. Nakabayashi (Figs. 5 and 8) also teaches the use of a reflector and cooled housing around a nozzle pipe chimney for improved thermal control. The nozzle pipe of Witzman's Fig. 14A is heated to a high temperature in the same manner as the nozzle pipe of Fig. 3A, and it would have been obvious to one skilled in the art to provide it with the same type of thermal shield as in Fig. 3A of Witzman or Nakabayashi. Also, Remondiere (Fig. 1) teaches the use of heat radiation reflectors around a nozzle pipe, and he makes clear that a vapor passage window should be provided in the reflectors at the location of a lateral vapor outlet. It would have been obvious to provide such reflector openings in a reflector around Witzman's

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Fig. 14A lateral vapor outlet in view of the teachings of Remondiere. Baxter also teaches the use of plural reflectors and a cooled housing (see Figs. 3 and 4). Baxter also teaches the use of a nozzle pipe having horizontally oriented vapor outlet openings (Fig. 5), and one skilled in the art would have recognized that Baxter intended for the embodiment of Fig. 5 to also be provided with reflectors and a cooled housing as in Figs. 3 and 4. From these teachings of Baxter, it also would have been obvious to provide the nozzle pipe of the embodiment of 14A of Witzman with reflectors and a cooled housing.

Regarding claims 22 and 24, it is noted that the particular temperatures used and the particular materials melted in the claimed apparatus are process limitations that are in effect recitations of intended use of the claimed apparatus, and the claimed apparatus is not so limited.

Regarding claim 15, Nakabayashi (see Fig. 8 and page 11, lines 3-20) discloses a vapor source having a crucible with a nozzle pipe located thereon. A separate heater is provided for each of the crucible and the nozzle pipe. The heaters are provided for the same purpose as the heaters of Witzman. The crucible heater vaporizes the coating material, and the nozzle pipe heater prevents condensation of the coating vapor with the nozzle pipe. Nakabayashi teaches that it is desirable to provide a first thermocouple to control the crucible heater, and a second thermocouple to control the nozzle pipe heater. It would have been obvious to one skilled in the art to provide the Fig. 14A vapor source of Witzman with separate heaters and separate thermocouples to desirably improve the temperature control of the vapor source.

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Claim 16 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Witzman (6,202,591) in view of Remondiere (4,880,960), Nakabayashi (JP 2001 192293) and Baxter (5,803,976) for the reasons stated in the rejection of claim 14 above, and taken in further view of Goldstein (5,321,260). Goldstein teaches (see the Fig. and col. 4, lines 25-27) the use of a tapered diameter joint to connect a crucible with a nozzle pipe. It would have been obvious to one skilled in the art to use a diameter taper to connect the chimney and crucible of Witzman because Goldstein teaches that a seal of sufficient degree can be successfully formed between a crucible and nozzle pipe using a tapered diameter joint.

Claims 17, 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Witzman (6,202,591) in view of Remondiere (4,880,960), Nakabayashi (JP 2001 192293) and Baxter (5,803,976) for the reasons stated in the rejection of claim 14 above, and taken in further view of Makino (3,417,733) and Roblin (3,672,327). Makino (Figs. 1-3) discloses a vapor source having a nozzle pipe 1, which has nozzle holes on its side to direct vapor laterally onto vertically aligned substrate surfaces to be coated. Makino teaches (col. 3, lines 46-75 and col. 4, lines 60-64) that it is desirable to provide a truncated cone shape (see element 2 of Figs. 1-3) having a coaxial filling opening at the top of the nozzle pipe. It would have been obvious to one skilled in the art to provide such a fill opening in the top of Witzman's nozzle pipe in the manner taught by Makino, to provide greater convenience of filling vaporizable material into the vapor source. Regarding the claimed truncated cone shape, Makino teaches that this shape can successfully be used, and it is considered prima facie obvious to use this shape in

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Witzman's vapor source, at least to the extent presently claimed. Makino intends his filling opening to be closed (col. 4, lines 60-64) by some closure element, but does not discuss what type of closure element he uses to close his inlet hole 2. Roblin (see figs. 3 and 4) also discloses a vaporizer in which a fill plug 50 (see Fig. 4 and col. 5, line 70 to col. 6, line 6) is used to close fill ports. The closure element 50 of Roblin is a "sealing mechanism" as recited in claim 1 as amended. It would have been obvious to provide the fill hole of Makino with a closure plug as taught by Roblin. Regarding claim 4, It is noted that "plunger" is defined as "a person or thing that plunges", while "plunge" is defined as to cast or thrust forcibly or suddenly into something". A fill plug includes a plug portion that thrusts into a fill port by force, and therefore can properly be considered to be a plunger. Regarding claim 21, Roblin teaches that graphite is a refractory material that can usefully be used to construct melting crucibles and nozzle pipes, and it therefore would have been obvious to use this material for the crucible and nozzle pipe of Witzman.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Witzman (6,202,591) in view of Remondiere (4,880,960), Nakabayashi (JP 2001 192293) and Baxter (5,803,976) for the reasons stated in the rejection of claim 14 above, taken in further view of Ingram (5,740,858) (see Fig. 1, for example), who teaches the use of a cooling pipe having a serpentine or meander shape for uniformly cooling a surface. This is a common and well-known shape for cooling pipes when uniform cooling of an extended area is desired. It would have been prima facie obvious to use this shape on

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a nozzle pipe housing to uniformly cool the housing. It is noted again that Nakabayashi teaches the desirability of providing a cooled housing around a nozzle pipe.

Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Witzman (6,202,591) in view of Remondiere (4,880,960), Nakabayashi (JP 2001 192293) and Baxter (5,803,976) for the reasons stated in the rejection of claim 14 above, and taken in further view of Ney (4,412,508) (abstract) or Mattord (6,011,904) (col. 3, lines 10-17) or Roblin (3,672,327), who all teach that graphite can successfully be used as a refractory material of construction for a crucible and nozzle pipe of a vapor source. It would have been obvious to one skilled in the art to utilize graphite as the refractory material of construction of Witzman because the secondary references teach that graphite can successfully be used as a vapor source material of construction.

Claims 1, 4, and 10 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Roblin (3,672,327). Roblin (see Figs. 3 and 4 for example) discloses a device for vapor deposition of vertically aligned regions of a substrate comprising a graphite melting crucible having a heater and a nozzle pipe comprising parts 46' and 56' of Fig. 4. It is noted that pipe 56' is supported directly by pie 46' (see col. 5, lines 67-70 of Roblin). A pipe heater (86 of Fig. 4) which is independent of the crucible heater is included. A sealing mechanism (50' or 32') is positioned above a coaxial filling opening. In Roblin's design, the nozzle pipe would inherently or obviously be "placed from above the melting crucible". Also, the nozzle pipe of Roblin comprises a taper shaped like a truncated cone on its upper end as recited in claim 4 (see pipe 56' of Fig. 4 of Roblin).

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Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Roblin (3,672,327) for the reasons stated in the rejection of claim 1 above, and taken in further view of Nakabayashi (JP 2001 192293). Nakabayashi (see Fig. 8 and page 11, lines 3-20) discloses a vapor source having a crucible with a nozzle pipe located thereon. A separate heater is provided for each of the crucible and the nozzle pipe. The heaters are provided for the same purpose as the heaters of Roblin. The crucible heater vaporizes the coating material, and the nozzle pipe heater prevents condensation of the coating vapor with the nozzle pipe. Nakabayashi teaches that it is desirable to provide a first thermocouple to control the crucible heater, and a second thermocouple to control the nozzle pipe heater. It would have been obvious to one skilled in the art to provide the Fig. 14A vapor source of Roblin with separate heaters and separate thermocouples to desirably improve the temperature control of the vapor source.

Witzman (6,202,591) taken in view of Makino (3,417,733) and in view of Pundsack

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Roblin (3,672,327) for the reasons stated in the rejection of claim 1 above, and taken in further view of Goldstein (5,321,260). Goldstein teaches (see the Fig. and col. 4, lines 25-27) the use of a tapered diameter joint to connect a crucible with a nozzle pipe. It would have been obvious to one skilled in the art to use a diameter taper to connect the nozzle pipe 46' of Roblin to the crucible 42' because Goldstein teaches that a seal of sufficient

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degree can be successfully formed between a crucible and nozzle pipe using a tapered diameter joint.

Claims 5, 6, 8, 9, 14, 17 and 19-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roblin (3,672,327) for the reasons stated in the rejection of claim 1 above, and taken in view of Witzman (6,202,591) and Baxter (5,803,976) and in further view of Cole (3,690,933). Roblin teaches that his heated vaporizer crucible and nozzle should be surrounded by heat insulation, but does not discuss details such as using plural concentric reflectors and a cooled outer housing. Baxter (see Figs. 3, 4 and 5, for example) and Witzman (Figs. 1A and 3a, for example) teach that it is desirable to provide plural reflectors and also a cooled outer housing around a heated vaporizer crucible, for protecting the substrate and other parts of the vacuum chamber from excess heat from the heater vaporizer. It would have been obvious to one skilled in the art to provide the heated vaporizer and nozzle pipe of Roblin with heat reflectors and a cooled housing as taught by Witzman and Baxter for the desirable purpose of preventing the heated vaporizer apparatus from radiating excess heat to its surroundings. Also, Cole is cited for his teaching at col. 3, lines 10-118, that resistive heating rods (such as resistive heating rods 82 of Witzman – see col. 8, line 24 of Witzman) were known in the prior art as a functional equivalent to the heater tubes enclosing burning gas disclosed by Roblin (see heater pipes 60 of Fig. 3 of Roblin, for example). Therefore, it would have been obvious to modify the apparatus of Roblin by providing it with the type of crucible heater used by Witzman. Regarding the multiple holes recited in claims 9 and 14-24, it is noted that Witzman and Baxter both teach that

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it is desirable to provide multiple holes in a vapor discharge nozzle to uniformly coat a wide substrate. Therefore, it would have been obvious to provide the discharge nozzle of Roblin with plural holes to adapt it for uniformly coating a wide substrate.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Roblin (3,672,327) for the reasons stated in the rejection of claim 1 above, and taken in view of Witzman (6,202,591) and Baxter (5,803,976) and in further view of Cole (3,690,933) for the reasons stated in the rejection of claim 14 above, and taken in further view of Nakabayashi (JP 2001 192293). Nakabayashi (see Fig. 8 and page 11, lines 3-20) discloses a vapor source having a crucible with a nozzle pipe located thereon. A separate heater is provided for each of the crucible and the nozzle pipe. The heaters are provided for the same purpose as the heaters of Roblin. The crucible heater vaporizes the coating material, and the nozzle pipe heater prevents condensation of the coating vapor with the nozzle pipe. Nakabayashi teaches that it is desirable to provide a first thermocouple to control the crucible heater, and a second thermocouple to control the nozzle pipe heater. It would have been obvious to one skilled in the art to provide the Fig. 14A vapor source of Roblin with separate heaters and separate thermocouples.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Roblin (3,672,327) for the reasons stated in the rejection of claim 1 above, and taken in view of Witzman (6,202,591) and Baxter (5,803,976) and in further view of Cole (3,690,933) for the reasons stated in the rejection of claim 14 above, and taken in further view of Goldstein (5,321,260). Goldstein teaches (see the Fig. and col. 4, lines 25-27) the use of a tapered diameter joint to connect a crucible with a nozzle pipe. It would have been

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obvious to one skilled in the art to use a diameter taper to connect the nozzle pipe 46' of Roblin to the crucible 42' because Goldstein teaches that a seal of sufficient degree can be successfully formed between a crucible and nozzle pipe using a tapered diameter joint.

Claims 7 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roblin (3,672,327) for the reasons stated in the rejection of claim 1 above, and taken in view of Witzman (6,202,591) and Baxter (5,803,976) and in further view of Cole (3,690,933) for the reasons stated in the rejection of claims 5 and 6 above, taken in further view of Ingram (5,740,858) (see Fig. 1, for example), who teaches the use of a cooling pipe having a serpentine or meander shape for uniformly cooling a surface. This is a common and well-known shape for cooling pipes when uniform cooling of an extended area is desired. It would have been prima facie obvious to use this shape on a nozzle pipe housing to uniformly cool the housing.

Claims 11 and 12 are considered to be allowable over the prior art of record.

Claim 13 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The rejections based on Nakabayashi and Cornelius as a primary reference have been removed in view of applicants' amendments and arguments.

Regarding Witzman, applicants have argued that Witzman does not have an opening on the upper end of the nozzle pipe. As stated in the rejections of the previous

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office actions and in the rejections above, it would have been obvious to provide a filling opening on the upper end of Witzman's nozzle pipe in view of the teachings of Makino.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Bueker whose telephone number is (571) 272-1431. The examiner can normally be reached on 9 AM - 5:30 PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parvis Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Richard Bueker
Primary Examiner
Art Unit 1763